Patent claims

1. A vacuum extraction unit for a device used to engrave a relief into the surface of a workpiece (24), in particular into a printing element such as for example a flexographic printing element, by means of radiation, in particular laser radiation, the workpiece (24) being a cylinder or a plate which is arranged on a cylinder during the engraving, with
- a hood (11), which covers a region of interaction between the radiation and the workpiece surface and comprises a vacuum extraction channel (12), the inlet opening (15) of which lies opposite the workpiece surface in the operating position of the hood and can be connected to a vacuum extraction line (38), and
- a C-shaped cover ring (13) with two ends that follow the circumference of the workpiece and are located at a distance from each other, and has a substantially U-shaped cross section, the hood (11) being arranged adjacent one of the two circumferential ends of the cover ring (13).

2. The vacuum extraction unit as claimed in claim 1, characterized in that the C-shaped cover ring (13) is exchangeable, so that when processing cylindrical workpieces (24) with different diameters a cover ring (13) from a number of cover rings (13) can be respectively chosen and used, the inside diameter of which ring is adapted as well as possible to the diameter of the cylindrical workpiece (24) respectively to be processed.

3. The vacuum extraction unit as claimed in claim 1 or 2, characterized in that the side walls (32) of the C-shaped cover ring (13) are provided with means

for reducing its free inside diameter, so that said ring can be set to correspond to the diameter of the cylindrical workpiece (24) respectively to be processed.

4. The vacuum extraction unit as claimed in claim 3, characterized in that the means for reducing the free inside diameter of the C-shaped cover ring comprise a lamellar seal (30).

5. The vacuum extraction unit as claimed in claim 4, characterized in that the individual lamellae (31) of the lamellar seal (30) are pivotably fastened to the side walls (18) of the cover ring (13).

6. The vacuum extraction unit as claimed in claim 3, characterized in that the means for reducing the free inside diameter of the C-shaped cover ring comprise exchangeable side parts, in particular side plates.

7. The vacuum extraction unit as claimed in one of the preceding claims, characterized in that the C-shaped cover ring (13) is circumferentially subdivided into at least two ring segments (13a, 13b, 13c), which are pivotably held against each other.

8. The vacuum extraction unit as claimed in claim 7, characterized in that the C-shaped cover ring (13) is circumferentially subdivided into three ring segments (13a, 13b, 13c) of different circumferential lengths, the circumferential length of an upper ring segment (13c) corresponding approximately to half the circumferential length of the cover ring (13), while the lower ring portion has two shorter ring segments (13a, 13b).

9. The vacuum extraction unit as claimed in one of the preceding claims, characterized in that a vacuum extraction nozzle (14) is arranged in an intermediate space between the hood and a circumferential end of the C-shaped cover ring (13) that is located upstream of the hood (11).

10. The vacuum extraction unit as claimed in one of the preceding claims, characterized in that the hood (11) has
-- a rear side to which a vacuum extraction line (38) can be connected,
-- two side walls (32), which have end edges (33) which lie opposite the workpiece (24) in the operating position of the hood (11), and
-- two directing walls (27, 34), which are located between the side walls (23), extend transversely in relation to the latter and which together with the two side walls (32) delimit the vacuum extraction channel (12) in the hood (11), an edge (36) of one (34) of the two directing walls lying opposite the workpiece in the operating position of the hood, while the other directing wall (27) has a convex, cylindrical curvature lying opposite the workpiece surface in the operating position of the hood and, in the region of this curvature, at least one opening (40), through which the radiation for processing the workpiece surface is guided.

11. The vacuum extraction unit as claimed in one of the preceding claims, characterized in that the hood (11)
-- has a rear side, to which a vacuum extraction line (38) can be connected,
-- two side walls (32), which have end edges (33) with a contour which is adapted to the contour of

the surface of a workpiece (24) to be processed, so that corresponding gap seals are formed when the end edges (33) lie opposite the workpiece (24) in the operating position of the hood (11), and

-- two directing walls (27, 34), which are located between the side walls (32), extend transversely in relation to the latter and which together with the two side walls (32) delimit the vacuum extraction channel (12) in the hood (11),

the hood (11) being provided with an opening (40), through which the radiation for processing the workpiece surface is guided.

12. The vacuum extraction unit as claimed in claim 11, characterized in that an edge (36) of one (34) of the two directing walls lies opposite the workpiece in the operating position of the hood, while the other directing wall (27) has a convex, cylindrical curvature lying opposite the workpiece surface in the operating position of the hood and in that the at least one opening (40), through which the radiation for processing the workpiece surface is guided, is arranged in the region of the curvature of the other directing wall (27).

13. The vacuum extraction unit as claimed in claim 10 or 12, characterized in that the curvature of the curved directing wall (27) is curved in the form of an arc of a circle.

14. The vacuum extraction unit as claimed in claim 13, characterized in that the curving of the curvature of the curved directing wall (27) is greater than the curving of the surface of the workpiece (24).

15. The vacuum extraction unit as claimed in claim 10 or 12, characterized in that the curvature of the curved directing wall (27) is exponentially curved.

16. The vacuum extraction unit as claimed in claim 10 or 12 to 15, characterized in that the opening or openings (40) through which the radiation for processing the workpiece (24) is guided is/are provided in the region of the curved directing wall (27) that lies closest to the surface of the workpiece (24) in the operating position of the hood (11).

17. The vacuum extraction unit as claimed in claim 10, characterized in that the end edges (33) of the side walls (32) have a contour which is adapted to the contour of the surface of a workpiece (24) to be processed, so that corresponding gap seals are formed.

18. The vacuum extraction unit as claimed in claim 10, 11 or 17, characterized in that the contour of the end edges (33) of the side walls (32) is a polyline that is adapted to the contour of the workpiece surface.

19. The vacuum extraction unit as claimed in claim 10, 11 or 17, characterized in that the contour of the end edges (33) of the side walls (32) is an arc of a circle that is adapted to the contour of the workpiece surface.

20. The vacuum extraction unit as claimed in one of claims 11, 12 or 17 to 19, characterized in that the distance between the end edges (33) of the side walls (32) and the workpiece surface in the operating position of the hood (11) is less than 50

mm, preferably less than 30 mm, in particular less than 10 mm but greater than 0.5 mm, and with particular preference between 1 mm and 5 mm.

21. The vacuum extraction unit as claimed in one of claims 11, 12 or 16 to 20, characterized in that the width of the gap seals formed between the end edges (33) of the side walls (32) and the workpiece surface lies in the range between 0.1 mm and 30 mm.

22. The vacuum extraction unit as claimed in one of claims 11, 12 or 16 to 21, characterized in that the hood (11) is exchangeably fastened to a processing head (23), so that when processing cylindrical workpieces (24) with different diameters a hood from a number of hoods is respectively chosen and fastened to the processing head (23), the side walls (32) of which hood have end edges (33) with a contour which is adapted as well as possible to the contour of the surface of the workpiece (24) respectively to be processed.

23. The vacuum extraction unit as claimed in one of claims 11, 12 and 17 to 22, characterized in that the side walls (32) of the hood are provided with means, in particular movable lamellae or exchangeable side parts, by which the contour of the edges of the side walls (32) that lie opposite a workpiece (24) can be changed in order to adapt them to the surface of the workpiece (24).

24. The vacuum extraction unit as claimed in one of the preceding claims, characterized in that, in the region of the curved directing wall (27) that lies closest to the surface of the workpiece (24) in the operating position of the hood (11), each working jet or beam, in particular working laser beam,

delivered by a processing head (23) is provided with an opening (40) of its own, through which the radiation for processing the workpiece (24) is focused on the latter.